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For two-letter codes and other abbreviations, refer to the "Guid-ance Notes on Codes and Abbreviations" appearing at the begin-ning of each regular issue of the PCT Gazette.

(54) Title: TELECOMMUNICATION SYSTEM AND METHOD OF COMMUNICATING PROTOCOL INFORMATION

** SOAP replaces some headers and filters other headers
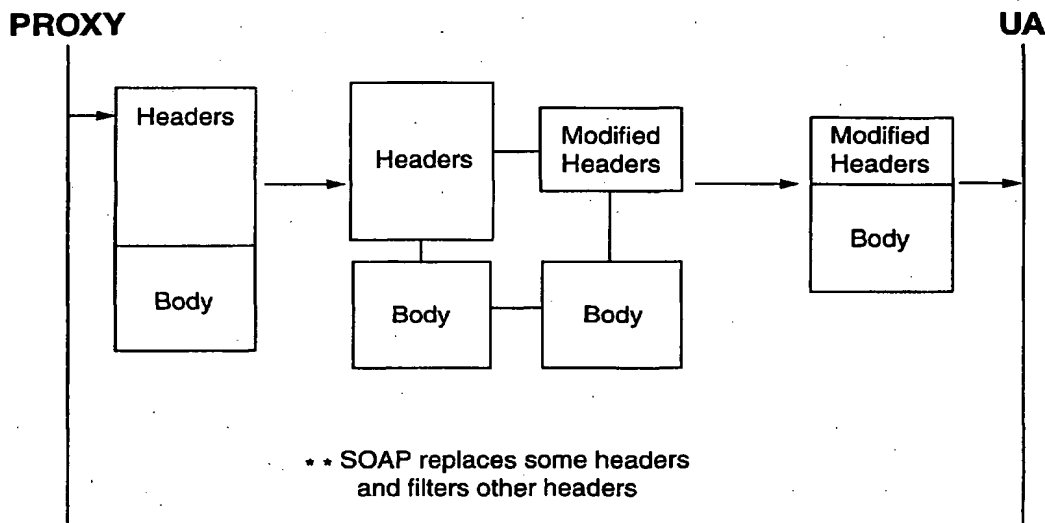
(57) Abstract: The present invention applies to telecommunication networks, such as wireless mobile networks. In particular, the present invention deals with providing more efficient use of the resources of such mobile networks. The present invention provides in a wireless mobile telecommunications network, having a wireless mobile access interface, a message filter function adapted to remove, store and/or adapt header information from messages transferred to/from a wireless mobile device. The present invention is based on using the SIP signalling channel within the workings of a mobile network system more efficiently.

Telecommunication System and Method of Communicating Protocol Information

FIELD OF INVENTION

The present invention applies to telecommunication networks, such as
5   wireless mobile networks. In particular, the present invention deals with providing
more efficient use of the resources of such mobile networks.

BACKGROUND ART

SIP is an application-layer control protocol that can establish, modify and
terminate multimedia sessions or calls. SIP has been gaining in popularity and is
10 considered likely to be the protocol of preference for application layer control of
multimedia and IP telephony services, and is indeed the protocol considered to
be selected to be used within 3GPP for multimedia sessions over IP to the
terminal.

The current developments of SIP, however, are mainly over wireline
15 systems where the length of the SIP messages has not been an important issue.

SIP is a text-based protocol that has great flexibility and is easy to
understand. However, particularly in the application to mobile networks, the SIP
messages have to carry information about the SIP proxy servers which are
involved in the call session, as well as, information about those SIP proxy servers
20 that may wish to be involved in the rest of the call session also. This can result in
considerable header information being carried with each SIP message.

It is considered desirable that the session control protocol should not have
lengthy messages. When SIP is applied on a wireless mobile interface, which is
considered to be a relatively expensive resource, the length of the SIP messages
25 are therefore considered unacceptable and an inefficient utilisation of a very
expensive resource.

Furthermore, wireless mobile interfaces are considered to have relatively
high error rates and unnecessarily lengthy messages such as the prior art SIP
messages noted above are considered more susceptible to corruption by virtue of
30 their length.

Unfortunately, the SIP messages of the prior art, which are already considered to be quite lengthy, may grow even longer as more functionality is developed for SIP.

The present invention seeks as an object to alleviate at least one problem
5   associated with the prior art.

Statements regarding the prior art throughout this specification are not to be taken as an admission of the state of common general knowledge in Australia in the field of the invention at the priority date of this application.

SUMMARY OF INVENTION

10   The present invention provides in a wireless mobile telecommunications network, having a wireless mobile access interface, a message filter function adapted to remove, store and / or adapt header information from messages transferred to / from a wireless mobile device. Henceforth, the term "filter" shall refer to a function which may remove, store and/or adapt.

15   The present invention also provides a method of communicating messages between a wireless mobile device and a message source/destination, in which the method includes filtering header information from messages destined to the mobile device, and adapting header information to messages emanating from the mobile device.

20   Preferably, the messages are SIP messages.

A telecommunications network, including the message filter function as noted above is also disclosed.

The present invention is based on using the SIP signalling channel within the workings of a mobile network system more efficiently. In effect, the present
25   invention will filter header information prior to sending the SIP message to the wireless mobile device. The present invention can be put into effect by a SIP on air proxy (SOAP) function. A list of proxy server identifiers are replaced by the identifier for a SOAP proxy server. Functional information which are not supported by the User Agent are filtered by the SOAP function. The effect is shorter
30   messages which, thus, provides a reduction in the radio resource utilisation and a corresponding increase in throughput.

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Preferably, the SOAP function resides either at a SIP Proxy Server or between the SIP User Agent and the SIP Proxy Server. On a session basis, the SOAP function filters the header information from the SIP messages sent by the SIP Proxy Server and stores them. In this way, for example, only the header

5   information required by the application layer is sent over the wireless mobile interface to a User Agent such as that present at a mobile device node. The filtered header information may then be adapted to messages sent in the reverse direction from the mobile client to the server side. The SIP on air Proxy (SOAP) function, according to the present invention, is configured to handle header

10   information in accordance with predetermined criteria.

Mobile device includes, without limitation, at least a mobile wireless telephone, personal digital assistant PDA, or generally, user equipment UE.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

15   Figure 1 illustrates schematically, a portion of a communication network including a wireless mobile access interface logically having a SOAP filter function according to one embodiment of the present invention,

Figure 2 illustrates schematically, a portion of a communication network including a wireless mobile access interface logically having a SOAP filter

20   function according to another embodiment of the present invention. The SOAP function in this embodiment may be co-located within a SIP Proxy Server,

Figure 3 illustrates schematically a view of the operation (in-part) of the present invention for messages communicated from a SIP Proxy Server to a SIP User Agent, and

25   Figure 4 illustrates schematically a view of the operation (in-part) of the present invention for messages communicated from a SIP User Agent to a SIP Proxy Server,

Figure 5 illustrates the communication relating to the present invention for the client side,

30   Figure 6 gives an example (only) of headers contained in each message of Figure 6,

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Figure 7 illustrates the communication relating to the present invention for the server side, and

Figure 8 gives an example (only) of headers contained in each message of Figure 7.

5   As seen in Figures 1 and 2 for example, the solution proposed, in this invention is to have a SIP on air Proxy (SOAP) function 21. The SOAP function 21 resides between the SIP User Agent 22 and the SIP Proxy Server 23. Referring to figures 3 and 4, on a session basis, the SOAP function 21 filters header information 11 residing within, for example, the application layer

10   information from the SIP messages 10 sent by the SIP Proxy Server 23 and stores this information. The header information may then be modified in accordance with predetermined criteria for transmission to a User Agent. For instance a given proxy server identifier(s) is/are replaced with the SOAP server identifier. In this way, only the user agent related header information required by

15   the application layer, for example, is sent over the wireless mobile interface 24.

The filtered, or similar, header information 11, specific to the particular session, may then be added to messages 10 sent in the reverse direction.

This stored header information may also be added for future messages associated with the same session.

20   Header information 11 includes, but is not limited to, the following:-

- Via
- Record Route
- Route (which is generated by SOAP based on Record Route stored)
- Warning (may be filtered for simple terminals which do not use this

25   information)

- Organization (may. be filtered ,screening function may be in the SOAP server)
- Request-URI (may be filtered for simple terminals)
- Other similar information.

30   The SOAP function 21 can be logically resident in the head-end of the wireless mobile access interface 25, although it can reside anywhere between the

5

mobile device and message source/destination. For GPRS and UMTS packet mode service, the SOAP function 21 can be co-located with the GGSN or can be separate from the GGSN. These alternatives are illustrated in figures 1 and 2 respectively.

5   Advantageously, it has been found that the present invention will significantly reduce the wireless mobile resources required by the call/session control for establishing multimedia/telephony call sessions using SIP. The wireless mobile device 20 will also have reduced processor load and memory usage with the elimination of extraneous information carried over the radio or

10   wireless interface 24. One implementation is considered to reside in the 3GPP IP Multimedia Subsystem.

A number of examples of an implementation of the present invention is now disclosed. It is to be noted that the present invention should not be limited to these examples only.

15   Example 1 :

Handling of Record Route and Route headers at the client side

Figures 5 and 6 illustrate the SOAP function 21 at the client side. The SOAP function 21 resides between the UAC 22 and a SIP Proxy Server 23. The SIP messages are identified as F1 to F6. Figure 6 identifies the relevant headers

20   contained in each message.

The SOAP function 21 stores the Record Route header (ie <P1>, <P2>) in the 200 F3 message and replaces it with its own address identifier (ie <SOAP>) in 200 F4.

When the UAC 22 subsequently sends a message, say a BYE F5, the

25   Route header (<SOAP>,<UAS contact>) is replaced with (<P1>,<P2>,<UAS contact>) in BYE F6.

Example 2 :

Handling of Via, Record Route and Route headers at the server side

Figures 7 and 8 illustrate the SOAP function 21 at the server side. The

30   SOAP function resides between the UAS 22 and a SIP Proxy Server 23. The SIP

messages are identified as F1 to F6. Figure 8 identifies the relevant headers contained in each message.

The SOAP function 21 stores the Record Route header (<P1>, <P2>) and Via headers (Via <UAC>, Via <P1>, Via <P2>) in the INVITE F1 message and

5   replaces them with its own address identifier (ie Via <SOAP> and Record Route <SOAP>) in INVITE F2.

When the UAS 22 subsequently sends The <Response> F3 or 200 F5 message, the SOAP function 21 replaces the Via and/or Record Route header (<SOAP>) with the stored Via and Record Route headers in <Response> F4 and

10   200 F6.

Example 3 :

Simple terminals and terminals with limited display capabilities

For relatively simple terminals and terminals with limited display capabilities, there are headers or parts of headers which can be filtered. The

15   SOAP function 21 may, for example, filter the Warning header or just filter the warn-text in the Warning header. Other headers such as Organization and Request-URI may also be filtered where it is determined that the terminal is incapable of utilising this information and would have discarded them anyway.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1.   In a wireless mobile telecommunications network, having a wireless mobile access interface,

a message filter function adapted to remove and / or store header information from messages transferred to / from a wireless mobile device.

2.   A message filter function as claimed in claim 1, wherein the removing and / or storing includes modifying the messages in accordance with predetermined criteria.

3.   A message filter function as claimed in claim 1 or 2, wherein the messages are SIP messages.

4.   A message filter function as claimed in claim 1, 2 or 3, wherein the filter is provided in the wireless mobile access interface; including the SIP proxy server.

5.   A telecommunications network, including the message filter function as claimed in claim 1, 2, 3 or 4.

6.   A method of communicating messages between a wireless mobile device and a message source/destination,

the method including the step of:

removing header information from messages destined to the mobile device, and adding header information to messages emanating from the mobile device.

7.   A method as claimed in claim 6, wherein the header information removed is substantially the same as the header information added.

8.   A method as claimed in claim 6 or 7 wherein, the step includes modifying the messages in accordance with predetermined criteria.

9.   A method as claimed in claim 8, wherein the filtered header information relates to a session.

10.   A method, system or device as herein disclosed.

Fig 1.

Fig 2.

Fig 3.

* * SOAP replaces some headers and filters other headers

Fig 4.

Fig 5.
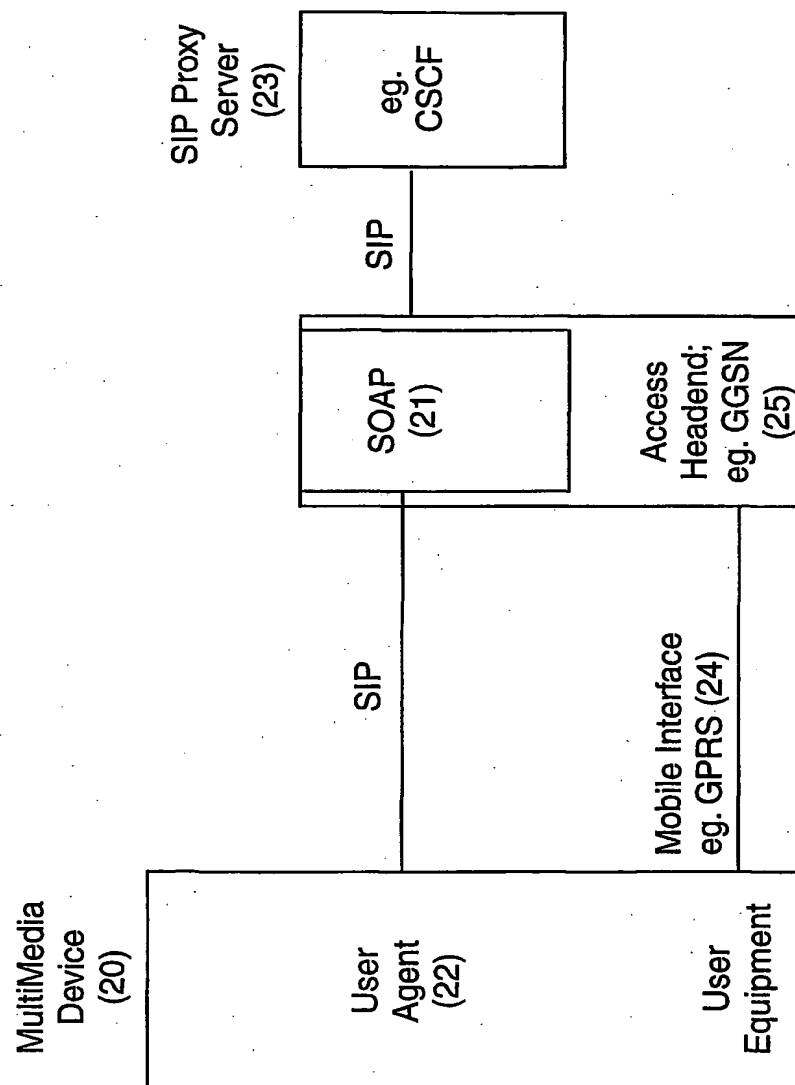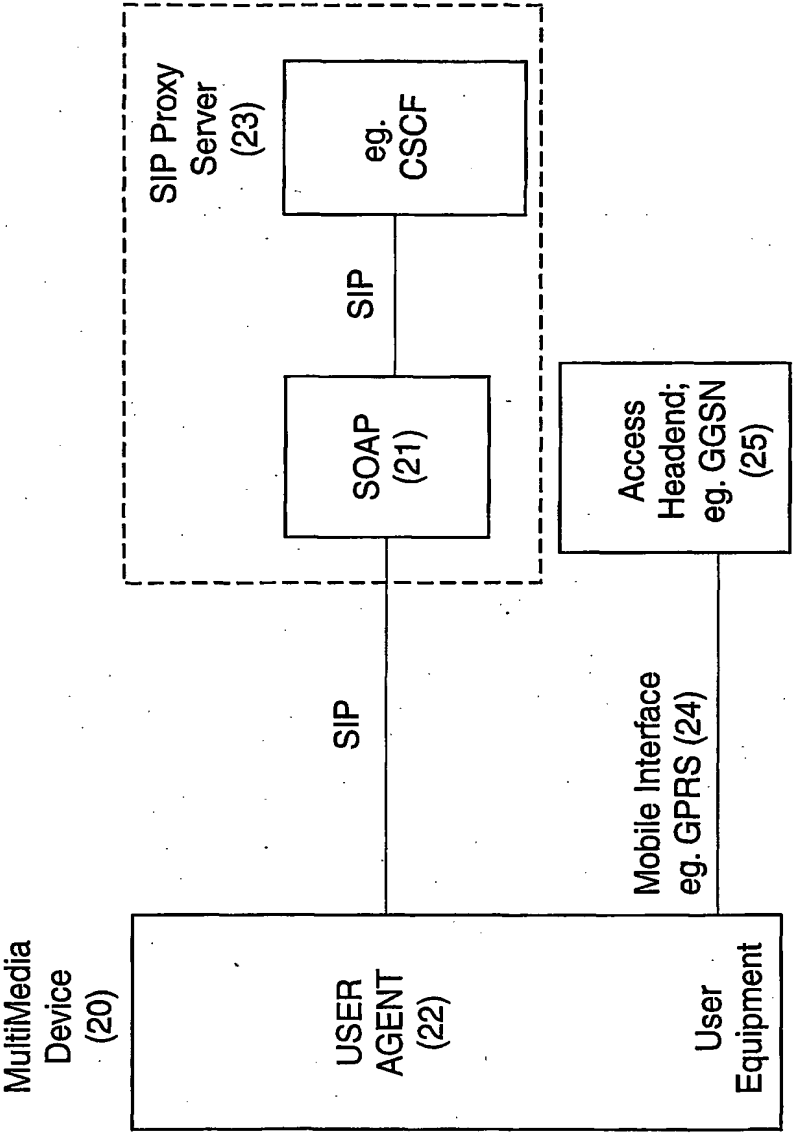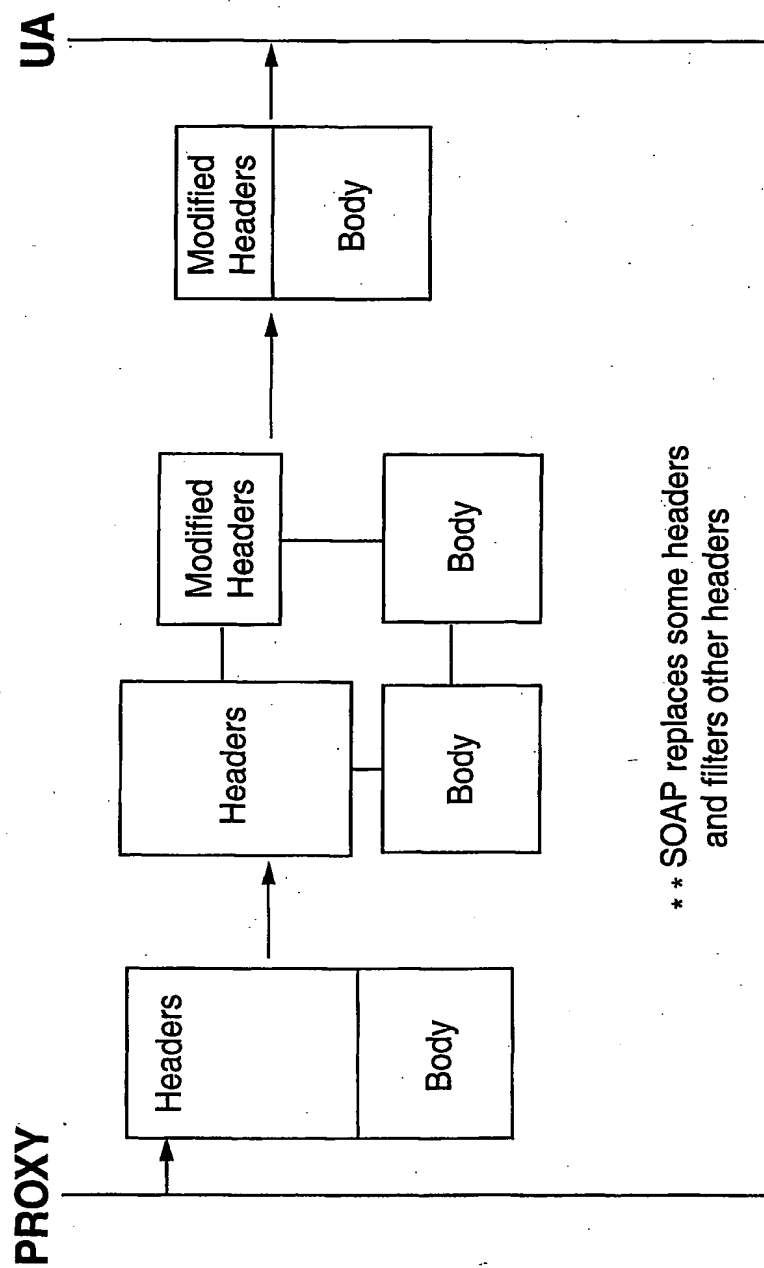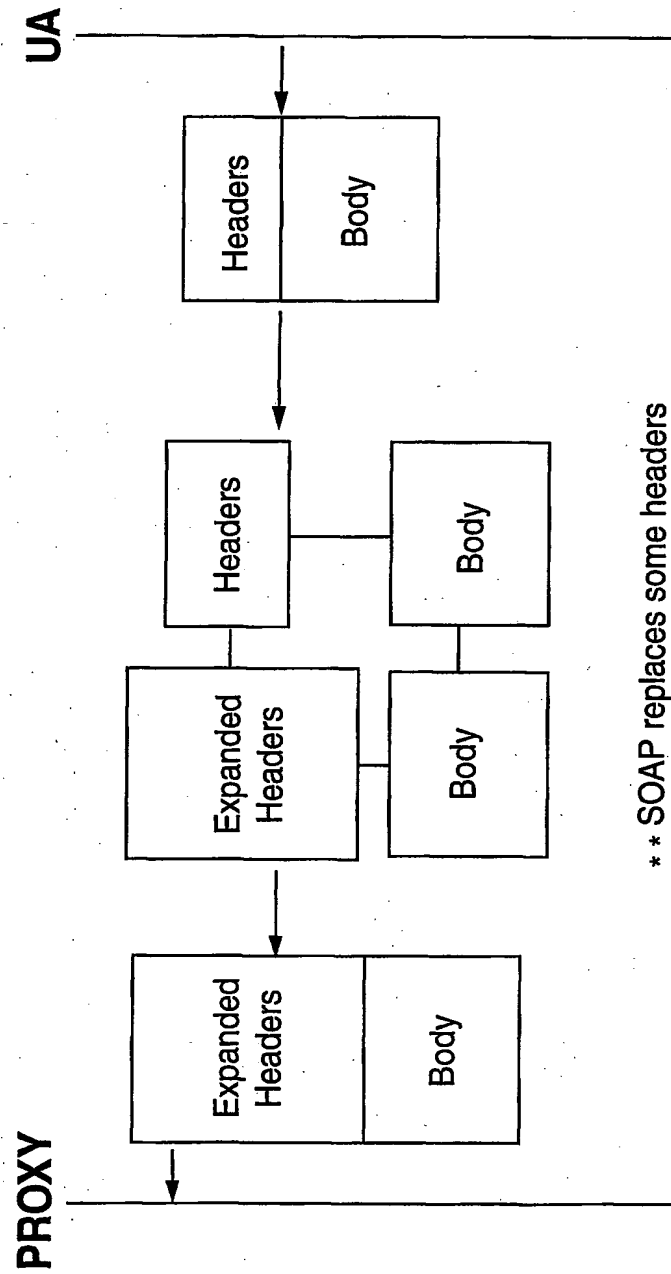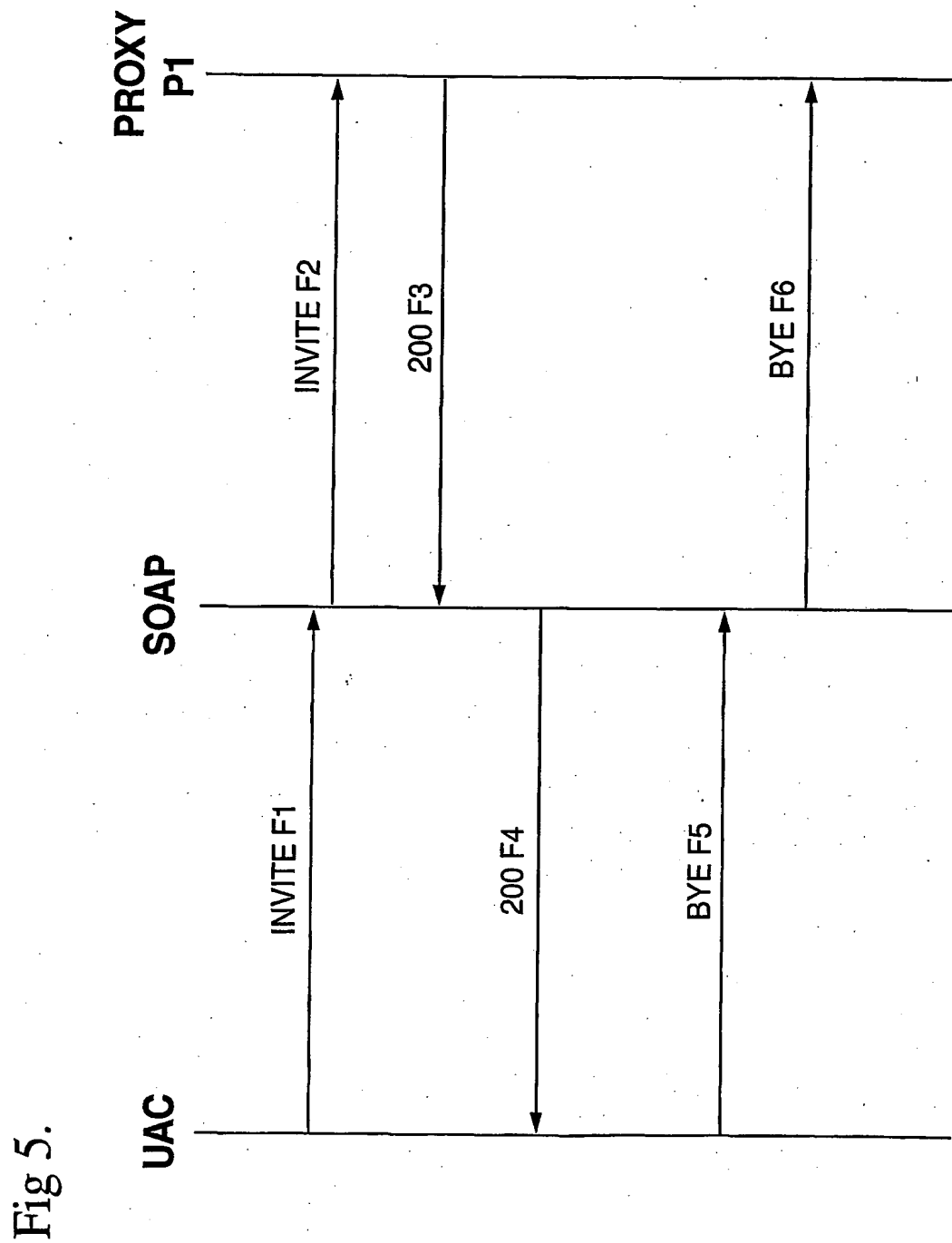
Fig 6.

SOAP AT UA CLIENT SIDE

- INVITE F1
  - Via <UAC>

- 200 F4
  - Via <UAC>
  - Record-Route <SOAP>

- BYE F5
  - Via <UAC>
  - Route <SOAP>,<UAS CONTACT>

- INVITE F2
  - Via <UAC>

- 200 F3
  - Via <UAC>
  - Record-Route <P1>,<P2>

- BYE F6
  - Via <UAC>
  - Route <P1>, <P2>,<UAS CONTACT>

Fig 7.
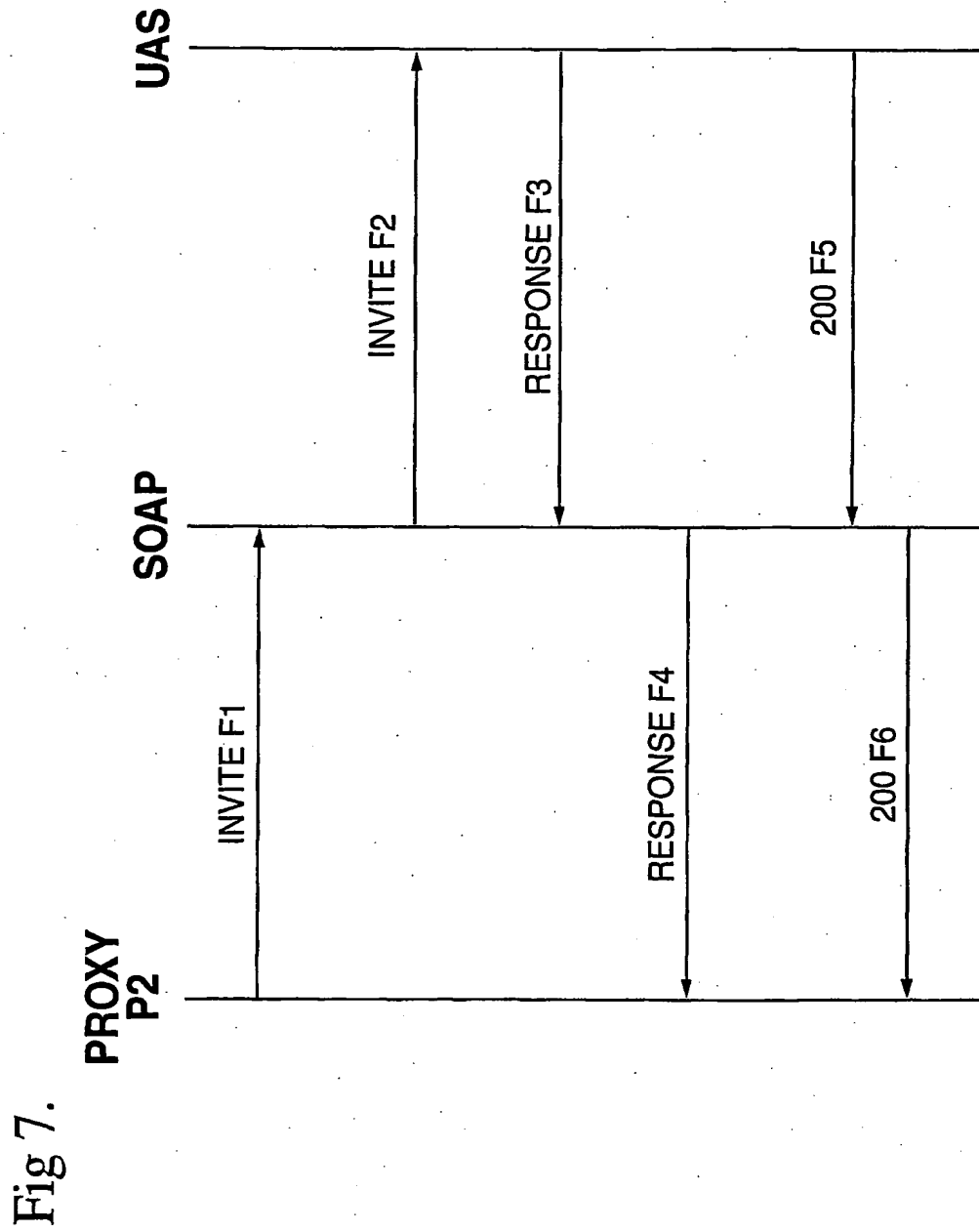
Fig 8.

SOAP AT UA SERVER SIDE

- INVITE F1
  - Via <UAC>
  - Via <P1>
  - Via <P2>
  - Record-Route <P1>,<P2>

- INVITE F2
  - Via <SOAP>
  - Record-Route <SOAP>

- <Response> F4
  - Via <P2>
  - Via <P1>
  - Via <UAC>
  - Record-Route<P1>,<P2>

- <Response> F3
  - Via <SOAP>
  - Record-Route<SOAP>

- 200 F6
  - Via <P2>
  - Via <P1>
  - Via <UAC>
  - Record-Route <P1>,<P2>

- 200 F5
  - Via <SOAP>
  - Record-Route <SOAP>

A.	CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]:   H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B.	FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT (wireless, network, access, connect, interface, filter, packet, cell, header)

C.	DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/04582 A1 (TELEFONAKTIEBOLAGET LM ERICSSON) 28 January 1999 page 18 , lines 11-25	1
A	WO 99/33291 A1 (TELEFONAKTIEBOLAGET LM ERICSSON) 1 July 1999 The whole document	

☐ Further documents are listed in the continuation of Box C ☒ See patent family annex

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
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"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed

"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search	Date of mailing of the international search report
30 August 2001	/3 SEPTEMBER 2001

Name and mailing address of the ISA/AU	Authorized officer
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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report			Patent Family Member			
WO	9904582	AU	89746/98	DE	19730363	EP	1005763
WO	9933291	AU	19896/99	GB	2349779		

END OF ANNEX